WHAT IS CLAIMED IS:

1. A connector to an optical fiber, comprising:

a prism that includes a triangular wedge element having a first surface, a second surface and a base;

a ferrule to guide the optical fiber so as to contact the optical fiber with the first surface of the prism, the first surface being substantially perpendicular to the optical fiber; and

an aspheric lens integrated on the second surface, the integrated aspheric lens being positioned so that the prism serves to redirect a light beam at an angle relative to an axis of the optical source input through total internal reflection by utilizing the base of the triangle wedge element, the aspheric lens serving to at least one of collimate the redirected light beam and focus the light beam before being redirected.

2. The connector of claim 1, wherein the connector is a fiber collimator.

3. The connector of claim 1, wherein the connector is a fiber coupler.

4. A fiber collimator, comprising:

a prism that includes a triangular wedge element having a first surface, a second surface and a base;

a ferrule to guide an optical source input to the fiber collimator so as to contact the optical source input with the first surface of the prism, the first surface being substantially perpendicular to the optical source input; and

an aspheric lens integrated on the second surface, the integrated aspheric lens being positioned so that the prism serves to redirect a light beam at an angle relative to an axis of the optical source input, and the aspheric lens serves to collimate the redirected light beam, the base of the triangle wedge element redirecting the light beam by total internal reflection (TIR).

5. The fiber collimator of claim 4, wherein the triangular wedge element is an isosceles triangle wedge, the length of the first surface being equal to the length of the second surface.

6. The fiber collimator of claim 4, wherein the prism further comprises a spacer element, the spacer element providing a mechanism to adjust an optical path length from the aspheric lens to the optical source input, allowing the focal length of the aspheric lens, and thereby the radius of the collimated light beam, to be adjusted while keeping the dimensions of the triangle wedge element constant.

7. The fiber collimator of claim 4, wherein diamond-turned inserts are utilized to define optical quality surfaces, including those for at least one of the prism, the aspheric lens and the TIR surface.

8. A fiber coupler, comprising:

a prism that includes a triangular wedge element having a first surface, a second surface and a base;

an aspheric lens integrated on the second surface, the integrated aspheric lens receiving a light beam, the aspheric lens being positioned so that the light beam is focused after passing through the aspheric lens, creating a focal spot image; and

a ferrule to guide an optical fiber of the fiber coupler so as to contact an optical fiber core of the optical fiber with the first surface of the prism at or near the location of the focal spot image, wherein the base of the triangle wedge element serves to redirect the focused light beam by total internal reflection (TIR) at an angle relative to an axis of the optical fiber, the focused light beam being directed into the optical fiber core.

9. The fiber coupler of claim 8, wherein the triangular wedge element is an isosceles triangle wedge, the length of the first surface being equal to the length of the second surface.

10. The fiber coupler of claim 8, wherein the prism further comprises a spacer element, the spacer element providing a mechanism to adjust an optical path length from the aspheric lens to the optical fiber, allowing the focal length of the aspheric lens, and thereby the numerical aperture of the light delivered to the optical fiber, to be adjusted while keeping the dimensions of the triangle wedge element constant.

11. The fiber coupler of claim 8, wherein the light beam received by the aspheric lens is an elliptically shaped, collimated light beam and the focal spot imaged onto the fiber core is circular or substantially circular, the base of the triangle wedge element having curvature to enable this TIR surface to act as a cylindrical mirror, the aspheric lens being toric with its principle axes aligned with those of the cylindrically curved TIR surface, the combination of the

cylindrically curved TIR surface and the toric aspheric lens serving to collimate and correct for spherical aberrations and rendering the focal spot imaged onto the fiber core circular or substantially circular.

12 The fiber coupler of claim 8 wherein the lens parameters for the aspheric lens is optimized by utilizing a source with a numerical aperture that completely fills the full aperture of the lens.

13 A collimating element, comprising:

a prism that includes a triangular wedge element having a first surface, a second surface and a base, the base of the triangle wedge element having curvature to enable it to act as a cylindrical mirror to redirect the light beam by total internal reflection; and

an aspheric lens integrated on the second surface, the aspheric lens being toric with principle axes aligned with those of the cylindrically curved base of the triangle wedge element, the integrated aspheric lens being positioned so that a chief ray of the light beam passes directly through the axis of the aspheric lens, wherein the light beam from an optical source input is an elliptically shaped beam, the elliptically shaped beam being redirected at an angle relative to an axis of the optical source input by the cylindrically curved base, the redirected light beam being collimated by the aspheric lens, the collimated light beam being a circularly or substantially circularly shaped beam, wherein the aspheric lens serves to collimate the redirected light beam, the base of the triangle wedge element redirecting the light beam by total internal reflection.

14. The collimating element of claim 13, wherein the optical source input is an edge-emitting laser.

15. A collimating optical subassembly for collimating and redirecting a divergent light beam from a point source, comprising:

an aspheric lens that receives and collimates the divergent light beam, creating a collimated light beam;

a spacer element above the aspheric lens; and

a wedge element that refracts the collimated light beam into air at an angle relative to the axis of the aspheric lens consistent with Snell's law, the wedge element being positioned above the spacer element, wherein the collimating optical subassembly is fabricated of optically transparent material and integrated as a single part using injection-molding techniques.

16. The collimating optical subassembly of claim 15, wherein the point source is a vertical cavity surface emitting laserdiode.

17. The collimating optical subassembly of claim 15, wherein the spacer element is inserted to allow molten optically transparent material to more easily flow through a mold for fabricating the collimating optical subassembly using standard injection molding techniques.

18. The collimating optical subassembly of claim 15, wherein the prism is made of an optically transparent material, the optically transparent material including any one of polycarbonate, polyolefin and polyethylimide.

19. The collimating optical subassembly of claim 15, wherein the aperture of the aspheric lens is made larger than the waist of collimated light beam outputted from the wedge element.

20. A focusing optical subassembly for redirecting and focusing a collimated light beam, comprising:

a wedge element that receives the collimated light beam traveling in air;

a spacer element below the wedge element; and

an aspheric lens below the spacer element, wherein the focusing optical subassembly is fabricated of optically transparent material and integrated as a single part using injection-molding techniques, and wherein the collimated light beam received by the wedge element travels in air at an angle relative to an axis of the aspheric lens, the wedge element redirecting a chief ray of the collimated beam through the spacer element along the axis of the aspheric lens, the aspheric lens focusing the collimated light beam to a point along its axis.

21. The focusing optical subassembly of claim 20, wherein a photodetector resides at the point to which the collimated light beam is focused by the aspheric lens.

22. The focusing optical subassembly of claim 20, wherein the spacer element is inserted to allow molten optically transparent material to more easily flow through a mold for fabricating the focusing optical subassembly using standard injection molding techniques.

23. An integrated optical assembly, comprising:

a fiber collimator that redirects and collimates a light beam from an optical source input, creating a collimated light beam;

at least two focusing optical subassemblies, the at least two focusing optical subassemblies being aligned along a common axis; and

an optically transparent block that receives the collimated light beam from the fiber collimator, the optically transparent block having a top side coated to act as a reflective mirror and a bottom side including thin film filters (TFFs), each with a different passband wavelength and each being positioned over each focusing optical subassembly, the top side being the side opposite to at least one of the fiber collimator and the focusing optical subassemblies,

wherein the collimated light beam travels in a zig-zag fashion within the optically transparent block, wavelength components of the collimated light beam being separated from each other by the TFFs with matching passband wavelengths and focused by the focusing optical subassemblies below the TFFs.

24. The integrated optical assembly of claim 23, further comprising

a connector housing that receives a fiber optical connector; and

a ledge structure adapted for positioning a printed circuit board, the printed circuit board being parallel to, and at a distance from, aspheric lenses of the focusing optical subassemblies when positioned in the ledge structure.

25. The integrated optical assembly of claim 24, wherein the integrated optical assembly is manufactured using injection molding of an optically transparent plastic.

26. The integrated optical assembly of claim 24, further comprising an optical multiplexer, wherein the connector housing designed to receive a duplex optical fiber, and the printed circuit board being also parallel to, and at a distance from, aspheric lenses of collimating optical subassemblies of the optical multiplexer when positioned in the ledge structure.

27. The integrated optical assembly of claim 26, wherein the integrated optical assembly is manufactured using injection molding of an optically transparent plastic.

28. The integrated optical assembly of claim 26, wherein the set of aspheric lenses belonging to the focusing optical subassemblies have a different prescription than the set of aspheric lenses belonging to the collimating optical subassemblies, and an array of photodetectors and an array of point sources reside on the printed circuit board having different heights.

29. An optical multiplexer of a zig-zag design, comprising:

a fiber coupler that redirects and couples a light beam with different wavelength components into an optical fiber;

at least two collimating optical subassemblies receiving light beams from different point sources, the at least two collimating optical subassemblies being aligned along a common axis;

an optically transparent block that receives light beams with different wavelength components, the optically transparent block having a top side coated to act as a reflective mirror and a bottom side including thin film filters (TFFs), each with a different passband wavelength and each being positioned over each collimating optical subassembly, the top side being the side opposite to at least one of the fiber coupler and the collimating optical subassemblies, wherein light beams from the point sources travel through the collimating optical subassemblies, the TTFs, the optically transparent block and the fiber coupler into the optical fiber.

30. The optical multiplexer of claim 29, wherein aspheric lenses for collimating and focusing a light beam diverging from one of the point sources having a particular sized aperture are used to project an image from the point source onto the fiber core with a controlled degree of magnification, which controls the sized aperture of the light beam delivered to the optical fiber and the resulting coupling efficiency.

31. The optical multiplexer of claim 29, wherein aspheric lenses for collimating and focusing a light beam diverging from one of the point sources having a particular sized aperture are used to project an image from the point source onto the fiber core with a controlled degree of magnification, which controls the tolerance of the coupling efficiency into the optical fiber to a displacement of the point source.

32. A mold assembly for fabricating an integrated optical assembly as a single injection-molded part, the integrated optical assembly including a connector housing, an optical de-multiplexer and an optical multiplexer, the mold assembly comprising:

first and second mold halves arranged to mate with each other, forming a draw direction oriented parallel to axes of aspheric lenses of a focusing optical subassembly of the optical de-multiplexer and a collimating optical subassembly of the optical multiplexer, and

a single slider used to form ferrules for a fiber collimator of the optical de-multiplexer and a fiber coupler of the optical multiplexer as well as to form the connector housing, wherein the first mold half is used to shape wedges of the collimating and focusing optical subassemblies and to shape aspheric lenses of the fiber collimator and the fiber coupler, and the second mold half is used to shape total internal reflection surfaces of the fiber collimator and the fiber coupler and to shape the aspheric lenses of the collimating and focusing subassemblies.

33. The mold assembly of claim 32, wherein spacers are interested to allow molten plastic to flow through the mold assembly during manufacturing of the integrated optical assembly as a single injection-molded part.

34. The mold assembly of claim 32, wherein the mold assembly provides a ledge structure to be molded in the single injection-molded part, the ledge structure existing in a plane parallel to the plane tangential to and passing through the apex of each of the aspheric lenses of the collimating and focusing optical subassemblies, the ledge structure allowing a printed circuit board, on which arrays of point sources and photodetectors are mounted, to be inserted and to be

parallel, within a few microns of tolerance, to the aspheric lenses of the collimating and focusing optical subassemblies.

35. An integrated optical subassembly, comprising:

a fiber coupler that redirects and couples a light beam with different wavelength components into an optical fiber;

at least two collimating elements that receives elliptically divergent light beams from edge-emitting lasers, the at least two collimating elements being aligned along a common axis and spaced so that the elliptically divergent light beams become redirected and collimated into circular or nearly circular light beams;

an optically transparent block that receives the circular or nearly circular light beams with different wavelength components, the optically transparent block having a top side coated to act as a reflective mirror and a bottom side including thin film filters (TFFs), each with a different passband wavelength and each being positioned over each collimating element, the top side being the side opposite to at least one of the fiber coupler and the collimating optical subassemblies, wherein the circular or nearly circular light beams travel through the TTFs, the optically transparent block and the fiber coupler into the optical fiber.

36. The integrated optical assembly of claim 35, further comprising

a connector housing that receives a fiber optical connector; and

a ledge structure suitable for positioning a printed circuit board, the printed circuit board being parallel to, and at a distance from, aspheric lenses of the collimating elements when positioned in the ledge structure.

37. The integrated optical assembly of claim 36, further comprising an optical de-multiplexer, the connector housing designed to receive a duplex optical fiber; and the printed circuit board being also parallel to, and at a distance from, aspheric lenses of focusing optical subassemblies of the optical de-multiplexer when positioned in the ledge structure.

38. The integrated optical assembly of claim 37, wherein the integrated optical assembly is manufactured using injection molding of an optically transparent plastic.